

TITLE OF INVENTION

VESSELS FOR MULTICOMPONENT PRODUCTS

FIELD OF ENGINEERING

The Invention concerns to containers in which there can be stored several
5 components, different in structure and/or in their aggregative state, mixed immediately before consumption to be preserved for a long period and to create the effect of freshly-mixed food stuffs, healthcare products, cosmetics, chemical agents, etc.

PREVIOUS LEVEL of ENGINEERING

10 Different types of the design of reservoirs intended for storage of various substances and their mixtures in given proportions are widely known in science and engineering.

Thus, it is known a device of a bottle cover for dosed out introduction of liquid or solid substances into a liquid (Patent US № 6561232; MIIK B65B 03/04;
15 published 13.05.2003). It consists of a container for the basic component, a cover with the chamber filled with a substance under pressure, one or more tubular containers filled with a liquid or solid introduced component. The device is also supplied with a disrupting element. The above-mentioned device uses a complex multistage system of containers, put into action after the chamber in the cover is
20 depressurized, and the working volume of the introduced component is limited by the construction of a tubular container.

It is also known a device of the separate container (Patent US № 3856138; MIIK B65D81/32C1; published in 1974). The device is a reservoir consisting of a receptacle and a container, which are laid concentrically and are sealed with a
25 bottom plug of the receptacle. The cover has a screwed joint. The container is structurally designed with the open bottom. When a cover is being removed, the container, connected to it, leaves the sealed joint with the bottom plug; which results in mixing up the components from the container and the receptacle.

This device can be used only if the container is removed from the
30 receptacle. Thus, laying out of the container along all the receptacle does not make it possible to mix the components at the moment of putting the device into operation.

From the technical point of view, the device for mixing up fluid and liquid (Patent RU № 2146641; МПК B65D81/32; published 29.07.1996) is the closest to the above-mentioned device. It was chosen as the prototype and it consists of the first receptacle for a liquid with an entry opening, closed with a cover and the
5 second receptacle for fluid, fitted into the upper part of the first receptacle, the external housing of the second receptacle with a breaking element in the form a pin, the connecting pipe and the drain pipe submerged into a liquid. The specified device operates as follows: initially it is necessary to wind up the cover till it stops, the second receptacle moves downward, the pin breaks a membrane of the
10 second receptacle. Then, turn the cover right-about so that the second receptacle moves upwards. Under pressure the fluid from the second receptacle goes into the receptacle with a liquid through the system of channels. After that, remove the empty second receptacle and the external housing with a breaking element. The above-mentioned device is not widely used as it has limited functional capabilities
15 and rather a complex design. The device can be used only after performing sequential operations; however, the process of mixing up is irreversible, i.e. the consumer does not have an opportunity to manage the process of mixing up the components at his own discretion.

Disclosure of the invention

20 The offered invention aims at developing of the reservoir for the multicomponent products, providing the reliability of its design; easy and secure depressurization of the container with an introduced component; reduction of actions to perform to activate the process of mixing up; removal of the end-product without the removal of the container; creation of the new functional capabilities, allowing to manage
25 the process of mixing up the components. Achievement of the set aims will provide the easy use of the device, including the possibility to model parameters of the end product just before using it for its intended purpose.

The set aim is achieved as follows: the reservoir for multicomponent products contains a receptacle for the basic component, a demountable cover, a container
30 for the introduced component, fitted into the upper part of the receptacle. It also

has, at least, one channel for the output of the end product. There is, at least, one hole in the container; additionally there is a valve closing the hole of the container. The container and the valve are connected with the possibility to be displaced one from the other along the guide members. The cover can interact with the container
5 and the valve.

The offered reservoir differs from the prototype in following: it contains, at least, one channel for the output of the end product. There is, at least, one hole in the container; additionally there is a valve closing the hole of the container. The container and the valve are connected with the possibility to be displaced from
10 each other along the guide members. The cover can be dismantled from the container or the valve; it also can be fixedly connected to them.

Presence of, at least, one hole in the container allows easy and safe depressurization of the container, which does not demand breaking of a membrane. Additional installation of the valve on the container, which closes the
15 hole of the container, provides reliability of the design, reduction of actions necessary to activate the process of mixing up. Presence of, at least, one channel for the output of the end-product provides makes it possible to take out the end-product without the removal of the container. Working out of a cover with the possibility of interaction with the container or the valve and also the connection of
20 the container and the valve with the possibility to be displaced from each other along the guide members creates some new functional capabilities, allowing the possibility to manage the process of mixing up the components and to model parameters of the end product just before using it for its intended purpose.

Detachable connection of the cover with receptacle can be made in the
25 form of a screwed connection, a retention pin, etc.

The container can be located inside the upper part of container, and the detachable connection with the cover can be fitted onto the receptacle.

The container can be located on the outside of the upper part of the receptacle, and the valve can be fitted inside the container; detachable connection with the cover
30 is located on the container. In case if the container is placed on the outside of the

upper part of the receptacle, the valve can be located on the outside of the container and the detachable connection with the cover is set on the valve.

The cover interacts with the container or the valve with its internal part which can be flat or in the form of a binding element of any of the known configurations (a push bar, a toothed member, a spiking, an advancing cam, a retention pin, a plug connector, etc.). The cover can be fixedly connected to the container or the valve, for example, by welding in the form of a one-piece construction; the cover can be set on the valve or the container using expendable fasteners or any other known ways of fixed connection.

The container or the valve can be provided with the binding elements - push bars, toothed members, spikings, advancing cams, retention pins, and plug connectors.

In case the valve is set on the outside of the container, the cover (with the help of the binding element) fixes the container and the valve in position when the valve closes the hole of the container. When removed, the cover transfers the movement to the container through the binding element.

In case the valve is established inside of the container, the cover (with the help of the binding element) fixes the container and the valve in position when the valve closes the hole of the container. When the cover is removed, the movement is transferred to the valve through the binding element; displacement of the valve results in its detachment with the hole of the container.

Displacement of the valve and the container one from the other can be carried out through the indirect action of the spring-controlled unit placed between the container and the valve. Any known spring group or a gasket, made from any plastic material, can be used as a spring-controlled unit. Presence of a spring-controlled unit allows to facilitate the process of removal of the cover due to the action of the spring-controlled unit. Forces, arising at this moment, give an additional movement to the valve, which results in detachment of the valve and the hole of the container. The spring-controlled unit is preferable in case if the inner part of the cover is flat.

Displacement of the valve and the container one from the other can be carried out through the creation of the positive pressure of one of the components. In this case when the cover is removed from the container, the valve and the container are displaced one from the other, opening the hole of the container.

5 If the valve is influenced by a spring-controlled unit and/or positive pressure of a component in the container, the cover fixes the container and the valve in position when the valve closes the hole of the container. When the cover is removed, the spring-controlled unit and/or positive pressure of a component in the container transfer the movement to the valve, which results in displacement of
10 the valve from the hole of the container.

In case of fixed connection of the valve with the cover, the cover fixes the container and the valve in position when the valve closes the hole of the container. When the cover is displaced, so is the valve. If a removable cap is fitted into the cover, it facilitates the use of the offered device.

15 The valve can be made in the form of an independent construction or as an element of the receptacle or the container.

Thus, removal or displacement of a cover sets the reservoir in the position "open"; simultaneously the valve and the container are displaced one from the other. Displacement of the valve and the container one from the other results from
20 the direct mechanical effect, if the cover is connected fixedly with the valve or the container, or through the binding element, if the cover can be dismounted from the valve or the container.

Opening of the hole of the container results from the necessary displacement of the container and the valve one from the other which is carried
25 out through the guide members.

The guide members can be made in the form of an independent construction or as parts of the receptacle, the container or the valve. The guide members can have any of the known forms, for example, the form of a ring, zigzag, spiral, rectilinear, etc.

30 The introduced component under the influence of its own weight and/or

positive pressure through the hole in the container enters into the receptacle and is mixed up with the basic component.

Positive pressure can be achieved if there is some gas, for example, carbon dioxide, in the container. Positive pressure can also be achieved if the hydraulic pressure is created due to the displacement of the valve and the container one from the other, for example, when the valve and the container are set in accordance with the principle of the piston - cylinder or in case of the additional installation of blades inside the container and/or inside a part of the valve, closing the hole of the container. Creation of the positive pressure can also be achieved using other known ways.

There can be one or several holes in the container. At least, one hole is necessary to organize the process of mixing up the components. Other holes can be necessary for the technological purposes.

The introduced component can be in one of the following states: liquid, powder or granules.

Pinned blades can be additionally set on the parts of the container submerged into the basic component, on order to improve the homogeneity of mixing up. They allow organizing a flow of liquid components when the container or the valve is displaced. The above-mentioned pinned blades are placed on the outside part of the container and the valve.

The reservoir, which is being patented, allows two possibilities of mixing up the components – the complete mixing up according to the formula of the manufacturer or dosed mixing up according to the formula of the consumer. The above-mentioned possibilities depend on the form and the position of the valve.

Uncontrolled complete mixing up of the components according to the formula of the manufacturer is made in case if the valve opens the hole of the container when the cover is removed.

Dosed mixing up of the components can be performed in case if the valve closes the hole of the container when the cover is removed. In this case, having chosen the necessary portion of the introduced component, you can interrupt the

process of mixing up the components at any time by the removal the cover from the reservoir. The valve closes the hole of the container. The portion of the introduced component depends on the period of time during which the reservoir is in the position "open". Thus, the consumer can model parameters of the end product just before using it for its intended purpose.

In case if the cover is connected to the container or to the valve by detachable connection, removal of the cover results in termination of interaction of a cover with the container or the valve; the container rests in the reservoir.

If the cover is fixedly connected to the container or to the valve, the cover can remain on the reservoir, and the evacuating of the end product is carried out through the channel intended for the output of the end product through the hole in the cover with the removable cap, thus, the container remains in the reservoir.

The end-product, prepared during the mixing up, is taken out from the reservoir through the channel. The channel can be placed between the receptacle and the container or it can be placed inside the container or the valve.

In order to facilitate the process of taking out of the end product from the bottom of the receptacle, the reservoir in question can additionally have a tube. In this case the end-product passes through this tube, which reaches the bottom part of the receptacle, and, then, it passes into the channel for the output of the end product.

Other variants of using the invention, which is being patented, are as follows: the end-product can pass through the channel into an additional hole in the cover or through the removable cap of the cover.

Moreover, the upper part of the container or the valve can be made in the form of a neck which can be slid out from the receptacle; that facilitates still further the use of the reservoir.

If the container consists from several chambers with introduced components, it is possible to make more complex multicomponent products.

The above-mentioned versions of the offered engineering solution have one whole functional purpose. They present the particular ways of making of the

valve, the container, the cover, of the guide members and their interactions in order to achieve the integrated technical result, that is to provide the displacement of the valve and the container one from the other and therefore, to put the reservoir into operating condition which activates the process of mixing up the components.

5 The best ways of implementation of the invention

The particular versions of the reservoir for multicomponent products, which is being patented, are described below with references to the enclosed illustrations.

Fig. 1: the design of the reservoir in the cross-sectional view as in example
10 1; the valve is placed on the external part of the container, guide members are made in the ring form.

Fig. 2: the design of the reservoir in the cross-sectional view as in example
2; the valve is placed on the internal part of the container, the guide members are made in the form of zigzag.

15 Fig. 3: the design of the reservoir in the cross-sectional view as in example
3; the valve is connected with cover by fixed connection, the removable cap is fitted into the cover, the guide members are formed by walls of the container and the valve.

Fig. 4: the design of the reservoir in the cross-sectional view as in example
20 4; the container is an element of the receptacle, the upper part of the valve is made in the form of a tube.

Fig. 5: the design of the reservoir in the cross-sectional view as in example
5; hydraulic pressure, resulting from of the displacement of the valve and the container one from the other, is used.

25 Fig. 6: the design of the declared reservoir in the cross-sectional view as in
example 6; displacement of the valve and the container one from the other results from the indirect action of pressure of the introduced component.

Fig. 7: the design of the reservoir in the cross-sectional view as in example
7 with the channel for the output of the end product through the valve; the channel
30 is connected with a tube which reaches the bottom part of the receptacle,

installation is made between the container and the valve of a spring group.

Fig. 8: the design of the declared reservoir in the cross-sectional view as in example 8; the channel intended for output of the end product is inside the container.

5 Example № 1.

Fig. 1 of the reservoir shows the following elements: the receptacle (the upper part) - 1 with the basic component - 2; the container - 3 with the introduced component - 4 and carbon dioxide - 5; the hole - 6 in the container 3; the valve-7; the channel - 8; the cover - 9; the push bar - 10; the guide members-11 in the form of the ring.

When the cover 9 with detachable connection is wound, the reservoir opens and the pressure in the receptacle 1 becomes equal to the atmospheric pressure; simultaneously the push bar 10 transfers the movement to the container 3 which displaces along the guide members 11 against the valve 7 fixed in the upper part of the receptacle 1. The reservoir is set in position "open", unlinking the hole 6 of the container 3 and the valve 7. Under the action of pressure of the carbon dioxide 5 the introduced component 4 is thrown out in the receptacle 1 through the hole 6 of the container 3 and is mixed up with the basic component 2. If the valve 7 opens the hole 6 of the container 3 when the cover with detachable connection 9 is dismantled, there occurs a uncontrolled complete mixing up of component 2 and component 4 according to the formula of the manufacturer. In case if the container 3 is made from transparent materials and the valve 7 closes the hole 6 of the container 3 when the cover with detachable connection 9 is dismantled, there occurs dosed mixing up of the components. When necessary portion of the introduced component 4 was chosen, the consumer can stop the process of mixing up the components by twisting off the cover with detachable connection 9 until it is detached. The container 3 and the valve 7 close the hole 6 of the container 3. In such a way the consumer can model the parameters of the end product just

before using it for its intended purpose. After the cover with detachable connection 9 is dismantled, the end-product can be freely taken out through the channel 8 formed by the receptacle 1 and the container 3.

5 Example № 2.

Another version of the reservoir differs from the reservoir shown in example № 1 in particular form of design and interaction of the container and the valve. Fig. 2 of the reservoir shows the following elements: receptacle (the upper part) - 1 with the basic component - 2; the introduced component - 4; carbon
10 dioxide - 5; the hole 6 of the container-20; the channel - 8; the cover with detachable connection - 9; the push bar - 10.

This version differs from version in Example 1 in the following: the guide members - 22 are of the zigzag form, the valve-21 is placed on the interior side of the container - 20 which is fixed in the upper part of the receptacle 1.

15 When being used, the cover with detachable connection 9 transfers the movement through the push bar 10 to the valve 21 which moves along the guide members 22 of the zigzag form and is displaced in a wave-like manner against the container 20 fixed in the upper part of the receptacle 1. The reservoir is set in position "open", unlinking the hole 6 of the container 20 from the valve 21.

20 Example № 3.

Fig. 3 shows a version of the reservoir for multicomponent products, which differs from version № 1 in particular form of design and position of structural elements against each other. Fig. 3 shoes the following elements: the receptacle (the upper part) - 1 with the basic component - 2; the introduced
25 component - 4; the cover - 31, made with the removable cap 33, the valve - 34, fixedly connected with the cover 31 and fitted inside the container - 32, which is fixedly connected to the receptacle 1; the valve - 35. The design operates similarly to the previously described versions. Its basic difference from the above-mentioned designs is in the following: the cover with detachable connection 31 is

fixedly connected to the valve 34, so that when the cover 31 is twisted, the container 32 opens. When the cap 33 is removed, the end-product is taken out through the channel 35 without dismounting of the cover 31.

Example № 4.

5 Fig. 4 shows the version of the reservoir for multicomponent products. This version of reservoir design of contains the valve - 41, the receptacle - 1 with the basic component - 2, the container - 42 which is made as an element of the receptacle - 1, the cover - 43, the binding element - 44, made in the form of the retention pin, the introduced component - 4, the hole - 6 of the container 42, the
10 channel-8. The basic difference from the designs in version № 1 is that the container 42 is an element of the receptacle 1, the upper part of the valve 41 is made in the form of a neck. When the cover 43 is dismounted, the binding element 44 raises the valve 41 above the receptacle 1 that results in unlinking of the valve 41 and the hole 6 of the container 42. The cover 43 is removed, and the
15 valve 41 is fixed in the top position above the receptacle 1. After mixing up the components the end-product is taken out through the channel 8 of the valve 41.

Example № 5.

Fig. 5 shows the version of the reservoir consisting of the following elements: receptacle (the upper part) - 1 with the basic component - 2, the
20 introduced component - 4, the container 50 with the hole 6; the channel - 8; the cover with detachable connection - 9; the push bar - 10, the valve 51, the guide members 52 made on the form of a thread; in the upper part of the container 50 there is a fabrication hole - 53. The basic difference from version described in example № 1, consists in the following: there are blades 54 in the container 50 and
25 the valve 51; one of the blades is connected to the valve 51, and the second is connected to the internal part of the container 50. When the cover 9 is twisted, the valve 51 and the hole 6 of the container 50 are disconnected; simultaneously the introduced component 4 undergoes the action of pressure, created by the blades 54. Under the effect of the hydraulic pressure the introduced component 4 is

thrown out from the container 50 at a high speed of a stream and is mixed up with the basic component 2.

Example № 6.

Fig. 6 shows the version of the reservoir with the receptacle (the upper part) - 1 with the basic component - 2; the container - 60 with the introduced component - 4 and carbon dioxide - 5; the hole 6 in the container - 60; the valve-61; the channel - 8; a cover with detachable connection - 9 the internal part of which is flat; the push bar - 10; the guide members - 62.

The design of the reservoir of this version differs from the one of the version № 1 in the position and the form of the container 60 and the valve 61; the guide members 62 form a part of the receptacle 1, the introduced component 4 is under pressure of carbon dioxide 5, the push bar 10 is in a flat part of the cover 9 and presses the container 60 to the valve 61. When being used, the cover with detachable connection 9 raises above the receptacle 1 and through the push bar 10 reduces the influence to the container 60 which is under the positive pressure of the component 5; the introduced component 4 lifts the container 60 along the guide members 62 against the valve 61. The reservoir is set in position «open», unlinking the hole 6 of the container 60 and the valve 61.

Example № 7.

Fig. 7 shows the version of the reservoir for multicomponent products which consists of the following elements: the receptacle (the upper part) - 1 with the basic component - 2; the container 70 with the introduced component - 4; the hole 6 of the container-70; the channel - 8; the binding element - 10. Except for the different if its form container 70 this version differs from the version № 1 in the following: it contains the valve 71, the cover 79 with the detachable connection made in the form of the retention pin, the guide members 72, the spring group 74, the tube 73 connected to the channel 8. The container 70 and the valve 71 are located above the receptacle 1; the guide members 72 are made as a part of the sides of the valve 71 and the container 70. The channel for the output

of the end product 8 passes through the tube 73 and the valve 71. When being used, the cover with detachable connection 79 transfers the movement to the valve 71 through the binding element 10. The valve 71 which under the action of the cover 79 and the spring group 74 goes along the guide members 72 and moves
5 upwards against the container 70. The reservoir is set in position «open», unlinking the hole 6 of the container 70 and the valve 71.

Example № 8.

Fig. 8 shows the version of the reservoir for multicomponent products which consists of the following elements: the receptacle (the upper part) - 1 with
10 the basic component - 2; the container 80 made with the open upper part, the introduced component - 4; the hole - 6 of the container 80; the cover with detachable connection - 9; the push bar - 10.

This version differs from the version № 1 in the following: it contains different in its form container 80, the valve 81, the guide members 82 and the introduced
15 component 4 in the form of a powder. When being used, the cover with detachable connection 9 transfers the movement through the push bar 10 to the container 80 which goes along the guide members 82, which give only rotational movement, and moves against the valve 81. The reservoir is set in position «open», unlinking the hole 6 of the container 80 and the valve 81.

20 The above-mentioned versions of the design of the reservoir for multicomponent products operate similarly to each other. Other possible designs of the offered reservoir are reduced to different combinations of the ways of connection of the container, the valve, and the guide members.

Industrial utilization

25 The use of the reservoir for multicomponent products will make it possible to improve the quality of such kind of reservoirs due to the new functional capabilities: reliability of a design; easy and safe depressurization of the container with the introduced component; reduction of actions to activate the process of mixing up; taking out of the end product without the removal of the container.

Besides, there appeared new functional capabilities providing management of the process of mixing up of the components; they will allow the consumer to model parameters of the end product just before using it for its intended purpose, taking into account particular circumstances and conditions.